

Figura MS1. Variación espaciotemporal del NDVI periodo 1985 a 2022.

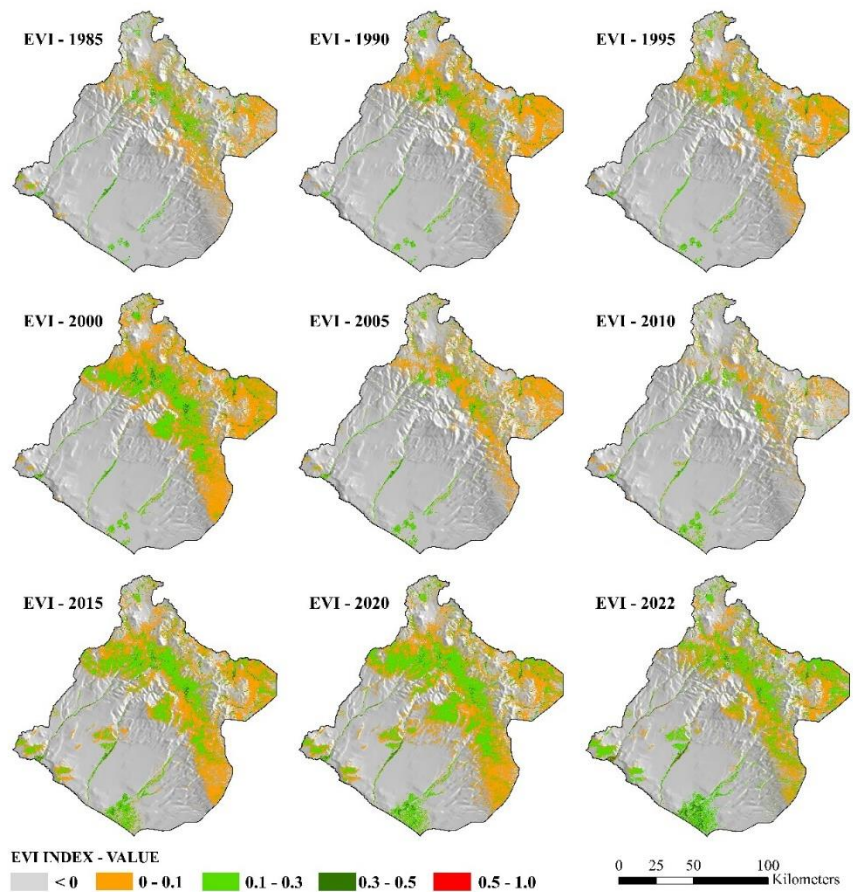


Figura MS2. Variación espaciotemporal del EVI periodo 1985 a 2022.

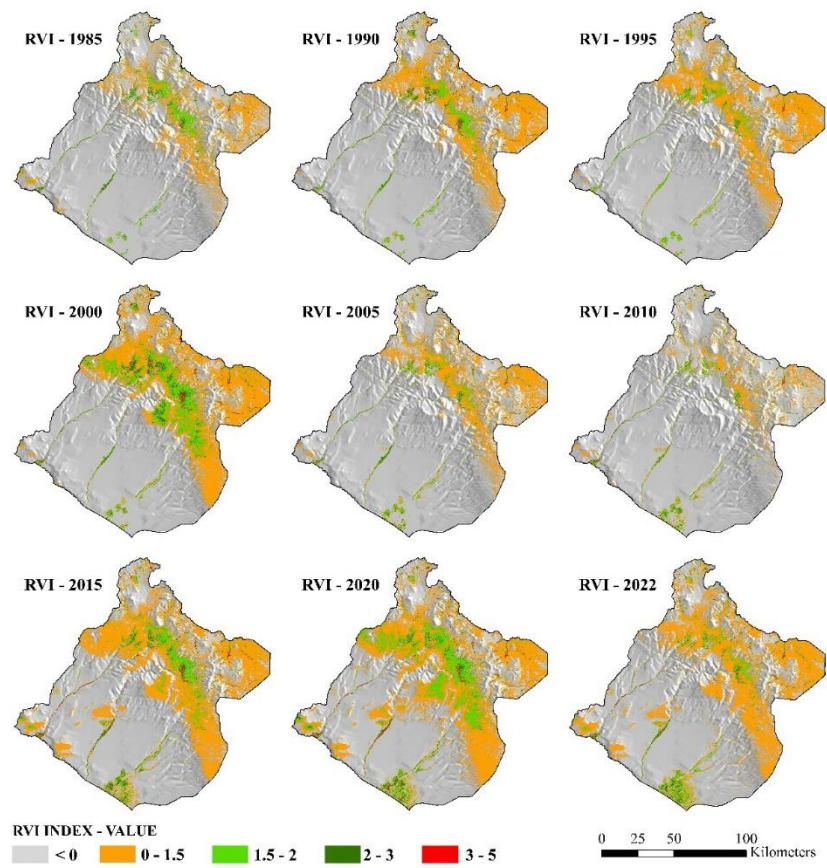


Figura MS3. Variación espaciotemporal del RVI periodo 1985 a 2022.

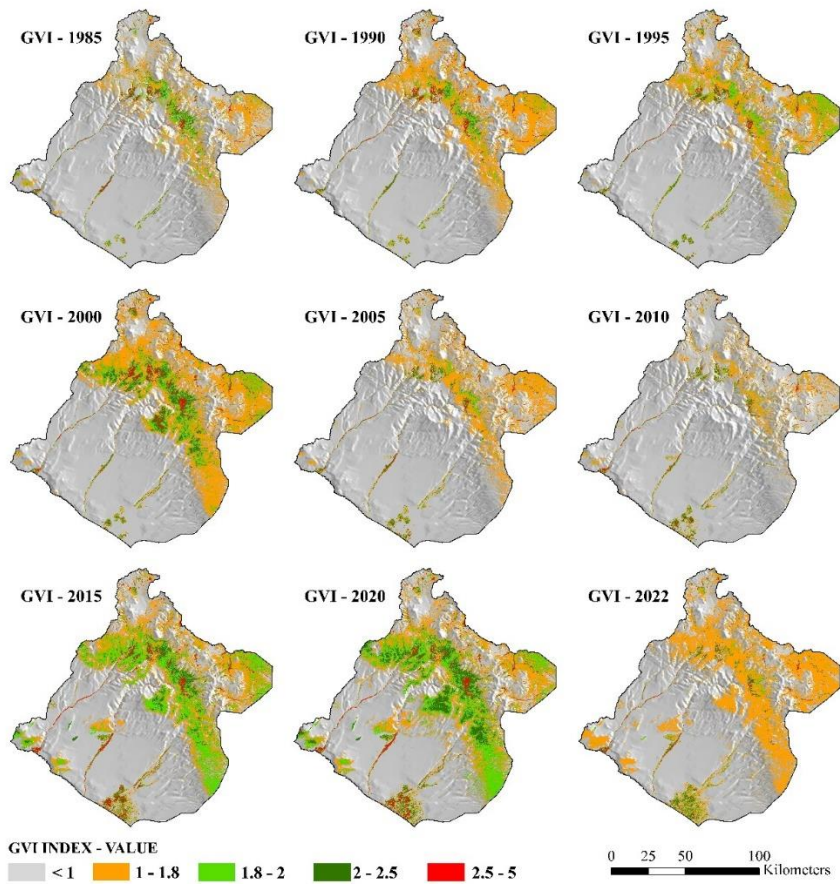


Figura MS4. Variación espaciotemporal del GVI periodo 1985 a 2022.

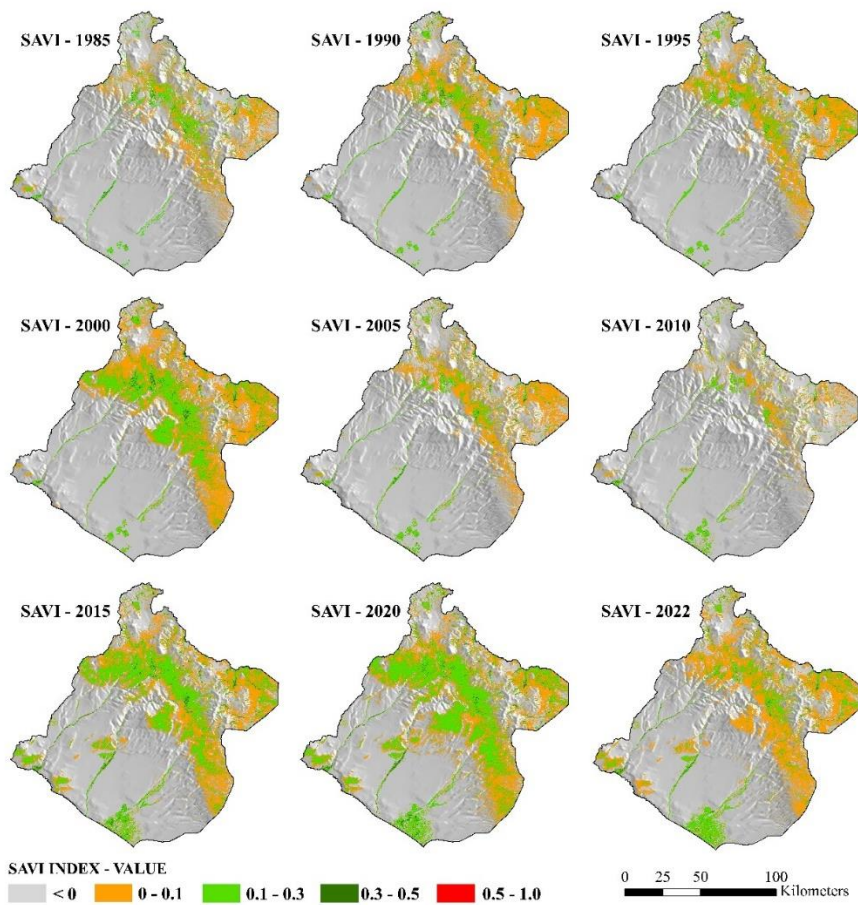


Figura MS5. Variación espaciotemporal del SAVI periodo 1985 a 2022.

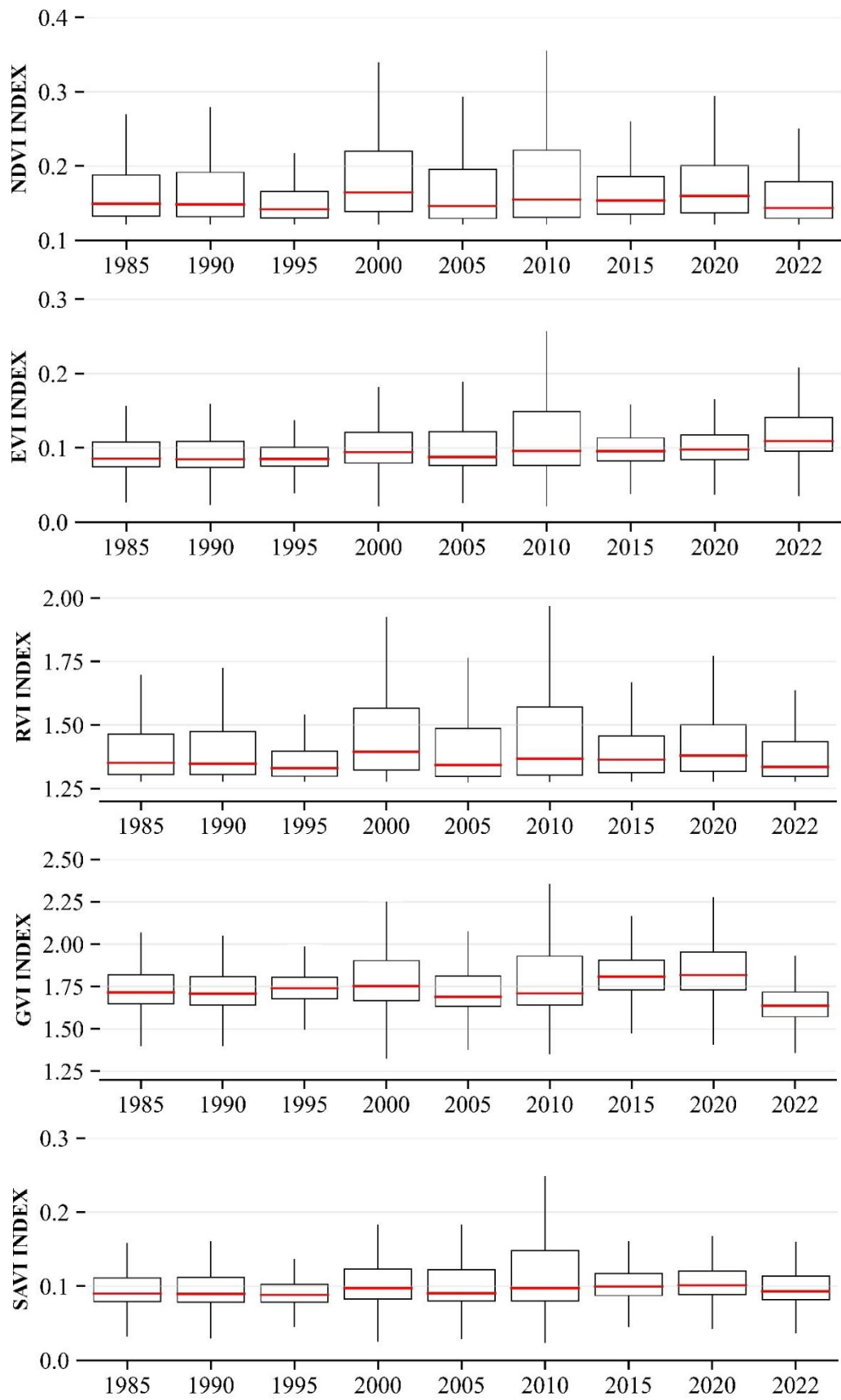


Figura MS6. Variación de los índices de biomasa en el período 1985 a 2022

Table 1

Evaluación de la precisión del uso y la cobertura del suelo de RF, período 1985-2022.

| Year | Land Cover Ground | Bare Soil | Biomass Area | Water Surface | Glacier Areas | Total | User Accuracy | Kappa Coefficient (k) |
|------|-------------------------|-----------|--------------|---------------|---------------|--------------|---------------|-----------------------|
| 1985 | Bare soil | 690 | 0 | 0 | 0 | 690 | 99,8 | 0,999 |
| | Biomass Area | 1 | 288 | 0 | 0 | 289 | 100 | |
| | Water surface | 0 | 0 | 340 | 0 | 340 | 100 | |
| | Glacier Area | 0 | 0 | 0 | 54 | 54 | 100 | |
| | Total | 691 | 288 | 340 | 54 | 1373 | | |
| | Producer accuracy | 100 | 99,8 | 100 | 100 | 399,8 | | |
| | Overall accuracy | | | | | 0,999 | | |
| 1990 | Bare soil | 770 | 1 | 0 | 0 | 771 | 98,3 | 0,987 |
| | Biomass Area | 8 | 317 | 0 | 0 | 325 | 99,6 | |
| | Water surface | 3 | 0 | 382 | 0 | 385 | 100 | |
| | Glacier Area | 1 | 0 | 0 | 59 | 60 | 100 | |
| | Total | 782 | 318 | 382 | 59 | 1541 | | |
| | Producer accuracy | 99,8 | 97,5 | 99,2 | 98,3 | 394,8 | | |
| | Overall accuracy | | | | | 0,991 | | |
| 1995 | Bare soil | 1298 | 0 | 0 | 1 | 1299 | 99,2 | 0,990 |
| | Biomass Area | 1 | 368 | 0 | 0 | 369 | 100 | |
| | Water surface | 4 | 0 | 373 | 0 | 377 | 100 | |
| | Glacier Area | 5 | 0 | 0 | 49 | 54 | 98 | |
| | Total | 1308 | 368 | 373 | 50 | 2099 | | |
| | Producer accuracy | 99,9 | 99,7 | 98,9 | 90,7 | 389,2 | | |
| | Overall accuracy | | | | | 0,995 | | |
| 2000 | Bare soil | 2794 | 1 | 0 | 0 | 2795 | 99,8 | 0,995 |
| | Biomass Area | 6 | 376 | 0 | 0 | 382 | 99,7 | |
| | Water surface | 0 | 0 | 378 | 0 | 378 | 100 | |
| | Glacier Area | 1 | 0 | 0 | 118 | 119 | 100 | |
| | Total | 2801 | 377 | 378 | 118 | 3674 | | |
| | Producer accuracy | 99,9 | 98,4 | 100 | 99,1 | 4553 | | |
| | Overall accuracy | | | | | 0,998 | | |
| 2005 | Bare soil | 577 | 3 | 0 | 0 | 580 | 98,3 | 0,981 |
| | Biomass Area | 9 | 217 | 0 | 0 | 226 | 98,3 | |
| | Water surface | 1 | 0 | 166 | 0 | 167 | 98,6 | |
| | Glacier Area | 0 | 0 | 0 | 94 | 94 | 100 | |
| | Total | 587 | 220 | 166 | 94 | 1067 | | |
| | Producer accuracy | 99,5 | 96 | 99,4 | 100 | 394,9 | | |
| | Overall accuracy | | | | | 0,988 | | |
| 2010 | Bare soil | 1089 | 0 | 0 | 0 | 1089 | 97,8 | 0,965 |
| | Biomass Area | 15 | 227 | 0 | 0 | 242 | 100 | |
| | Water surface | 4 | 0 | 188 | 0 | 192 | 100 | |
| | Glacier Area | 5 | 0 | 0 | 13 | 18 | 100 | |
| | Total | 1113 | 227 | 188 | 13 | 1541 | | |
| | Producer accuracy | 100 | 93,8 | 97,9 | 72,2 | 363,9 | | |
| | Overall accuracy | | | | | 0,984 | | |
| 2015 | Bare soil | 190 | 4 | 0 | 0 | 194 | 95,9 | 0,980 |
| | Biomass Area | 5 | 735 | 0 | 0 | 740 | 96 | |
| | Water surface | 0 | 0 | 187 | 0 | 187 | 100 | |
| | Glacier Area | 3 | 0 | 0 | 14 | 17 | 100 | |
| | Total | 198 | 739 | 187 | 14 | 1138 | | |
| | Producer accuracy | 97,9 | 99,3 | 100 | 82,3 | 2082 | | |
| | Overall accuracy | | | | | 0,989 | | |
| 2020 | Bare soil | 216 | 6 | 0 | 0 | 222 | 95,5 | 0,982 |
| | Biomass Area | 5 | 921 | 0 | 0 | 926 | 95,6 | |
| | Water surface | 1 | 0 | 180 | 0 | 181 | 100 | |
| | Glacier Area | 4 | 0 | 0 | 207 | 211 | 100 | |
| | Total | 226 | 927 | 180 | 207 | 1540 | | |
| | Producer accuracy | 97,3 | 99,4 | 99,5 | 98,1 | 2858 | | |
| | Overall accuracy | | | | | 0,990 | | |
| 2022 | Bare soil | 296 | 1 | 0 | 1 | 298 | 94,2 | 0,979 |
| | Biomass Area | 12 | 780 | 0 | 0 | 792 | 99,8 | |
| | Water surface | 6 | 170 | 170 | 0 | 346 | 100 | |
| | Glacier Area | 0 | 0 | 0 | 214 | 214 | 99,5 | |
| | Total | 314 | 951 | 170 | 215 | 1650 | | |
| | Producer accuracy | 99,3 | 98,4 | 96,5 | 100 | 3002 | | |
| | Overall accuracy | | | | | 0,986 | | |